Abstract

The ever growing interest in developing green energy worldwide has led to the development of hybrid energy system. Many hybrid energy systems do involve wind systems due to the availability and easy access of wind resource. This paper works on the development and the simulation of a wind farm adaptable to high voltage transmission network. It also implements a control of pitch angle using a PID controller, in order to stabilize rotor speed. Firstly a comprehensive analytical model of wind turbine has been presented and this was followed by the modeling of the wind farm under SimPowerSystem of Simulink. The simulated wind turbine system uses a Doubly Fed Induction Generator (DFIG) having a capacity of six (6) MW that supplies a distribution system at 33 KV. A load is connected at the end of the distribution network through a 20 km, 33 KV feeder. PID control system has been implemented to regulate the speed of the rotor vis-à-vis the wind speed variations. Results show that the speed regulation was very good. In permanent regime, the variation of rotor speed was almost insignificant despite the continuous variation of the wind speed within the interval of 12 to 15 m/s. At the same time, the active and reactive power obtained were in agreement with the simulation pre-set values.
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A Wind Turbine System Model using a Doubly-Fed Induction Generator (DFIG)

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Index Terms

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Keywords

Power coefficient  DFIG  PID controller  Rotor Speed  Generated Voltage and Current.